

of including details which cannot possibly be thoroughly understood by the ordinary lay reader. For example, a certain amount of description of microscopic structure is included, which is either too much or too little. It would probably have been better omitted entirely. Again, a short list of muscles, such as is given on p. 14, cannot be of any value whatever to the reader for whom the book is intended. Most of the illustrations are good, but some of them—notably Fig. 2—are far from clear.

The compilation has much to commend it, and at the same time has many of the defects which appear to be inseparable from books of its kind.

#### HIGHER EDUCATION IN GERMANY.

*The German Universities and University Study.* By Friedrich Paulsen. Authorised translation by Frank Thilly and William Elwang. Pp. xvi+451. (London: Longmans, Green and Co., 1906.) Price 15s. net.

THIS excellent translation of Prof. Paulsen's celebrated book on the German universities will be welcomed by many readers interested in the question of university education who have not the time or opportunity to read it in the original; the book is not merely an account of German universities, but treats the general subject of higher education in its relation to the advancement of knowledge and to the life of the community on a broad and philosophic basis.

The peculiar value which seems to us to attach to this work is due to this very breadth of view; the author is concerned, not with pressing the importance of some particular aspect of university life or of the claims of a particular branch of learning, an attitude which reduces so much of the writing on English education to mere sectional pamphleteering, but with the presentation of the historical development of university life, and especially with the function of the university under modern conditions, and with the problems which these conditions bring in their train. It is probably true that it is easier to be dispassionate when one is contented, and Prof. Paulsen is, on the whole, contented with the German universities and what they have done and are doing for the culture of the German people; but his contentment goes deeper; he is satisfied that the universities in Germany owe their hold over the intellectual life of the people to their unreserved acceptance of the scientific spirit, that is to say, the spirit of inquiry and free investigation into all the departments of learning. The university is defended and vindicated by the author primarily as an institution for research and the advancement of knowledge, and secondarily as a place of education; secondarily, not from the mistaken notion that education is considered less important than the expansion of the limits of knowledge, for we may remember that the only way of entering the learned professions, including school-mastering and the Civil Service in Germany is

through the university, but because the most important part of a university education is considered to be the actual contact with the fountains of knowledge and the acquisition of a capacity to grapple with original sources and to form an independent opinion. The system undoubtedly has its dangers, especially the danger of over-specialisation and the fault of encouraging students to undertake scientific investigation who would be more fittingly employed in practical affairs; but the author considers that the universities have gained and retained their influence by standing in the van of new ideas as the home for investigation, instead of handing on traditional learning, tardily and painfully modified from without by the changes of the times.

It is interesting to note the parting of the ways between the French and German universities at the beginning of the nineteenth century; the Napoleonic era converted the French universities into technical schools for the professions, and banished the pursuit of learning to the academies, while at that very time Humboldt founded the modern University of Berlin in direct opposition as an institution of free learning and broad education, and to that ideal all the German universities conformed.

There can hardly be any doubt as to which ideal has proved most fruitful, but the plan is apparently now advocated in some quarters in Germany of attempting to combine the technical schools in a closer alliance with the universities, and Prof. Paulsen has sufficient faith in the innate Teutonic love of learning to believe that science would not thereby be strangled in the grasp of a short-sighted utilitarianism. This, of course, especially applies to the natural sciences; but in all the faculties there have grown up, side by side with the universities, technical academies of art, military science, commerce, jurisprudence, and the like, which train an increasing number of students.

"All public institutions of learning," remarks Prof. Paulsen, "are called into existence by social needs," and it is interesting to follow the historical evolution of the university from this point of view as it is skilfully delineated by the author. The mediæval universities seem really to have satisfied our modern ideals to an extent which is perhaps not commonly suspected, and will probably never be re-attained; they were, in the first place, cosmopolitan, and not under the restrictions of a particular country or Government, and they were the true repositories of the learning of their times. With the coming of the Renaissance, and later of the Reformation, a change of the greatest importance occurred; from being cosmopolitan they became strictly territorial, from being free they became the *instrumenta dominationis* of the particular Government under which they happened to be.

In consequence, the faculty of law was chiefly fostered to the detriment of all others, and towards the end of the seventeenth century in Germany university life was at a very low ebb. With the foundations of Halle and Göttingen in the eighteenth

century a revival began, which Prof. Paulsen traces largely to the rise of the philosophical faculty from servitude as *ancilla theologiae* to the leadership, though it doubtless corresponded with the awakening of the general intellectual life of the country inaugurated by Klopstock and Lessing.

But the old freedom of the universities in Germany was necessarily never revived in its completion, and the position of the university as a State institution dependent to a large degree in its internal administration on the Government of the country in which it is situated leads to anomalies even now which Englishmen will not readily understand, though the real interference with freedom may be less than it seems. Thus the government of the university, even extending to the syllabus of studies in a particular faculty, is potentially, and sometimes actually, under the control of a Minister of Education, while the ordinary professors are appointed by the Sovereign of their country and the extraordinary by the Minister of Education, and it appears from the statistics quoted by Prof. Paulsen that in a fair proportion of cases the appointment runs counter to the recommendation of the faculties; but our author, ever determined to see both sides of a question, remarks that political and Court intrigues tend to efface the back-stairs politics of the faculties, so that in the end the right man is usually chosen.

It follows also from the dependency of the universities on the State that the teachers must hold cautious political views, and even Prof. Paulsen has nothing at all to say in favour of the Prussian Ministry which dismissed a privatdocent of physics from his post on the sole ground that he was a social democrat.

To choose one more point from a book absorbing throughout in interest, it is instructive to note that the absence of all social life such as is enjoyed at the old English universities does not cause that complete satisfaction which opponents of the system are so keen to insist on, but in several instances boarding-houses are being instituted where students can live in common. In the Middle Ages the residential collegiate system was, of course, universal, and a few colleges were retained long after the system had died out on the Continent for the benefit of the poorer students. It can hardly be held that the collegiate system persisted in England for the same purpose.

We may sketch the plan of Prof. Paulsen's work as follows:—in the first book we are given an outline of the historical development of the universities from the Middle Ages down to modern times, and probably nowhere else can so much be learnt on this subject within the compass of about seventy pages; the succeeding books are concerned with present-day conditions, the second treating of the relation of the university to the State, to society, and to the Church, the third dealing with university teachers and the methods of instruction, the fourth with university life from the student's point of view. In the fifth book some special problems connected with the several faculties of theology, law, medicine, and philosophy are discussed.

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#### GEODESY IN THE SCHOOLS.

*Text-Book on Geodesy and Least Squares Prepared for the Use of Civil Engineering Students.* By Prof. Charles L. Crandall. Pp. x+329. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1907.) Price 12s. 6d. net.

SUCH a treatise offers little scope for originality of treatment or of design. The problems connected with triangulation, or with measurement, or with levelling have been considered too frequently and too minutely by experts to permit the introduction of novelty. Similarly in the application of the results of measurement to the discussion of the figure of the earth, the author must follow beaten paths and occupy ground that has been thoroughly surveyed. His opportunity for exhibiting independence lies rather in the judicious selection of materials, and particularly in determining what should be omitted, that is to say, in considering the requirements of those for whom he is writing. Prof. Crandall is addressing himself primarily to students of Cornell University, and presumably to those who are beginning the study of the subject and not to professional men engaged in actual work.

For a text-book to be used by beginners it might be objected that the author has a little overlaid his treatise with a superfluity of detail. The increased attention given in university training to the study of geodesical problems and the determination of the coordinates of a station on the earth's surface is a feature that should be welcomed and encouraged. On many grounds it may be urged that the use of instruments in the field is an admirable training, more especially as it affords opportunities for the application of those formulæ which have been acquired from bookwork. For this reason one could defend the somewhat lengthy description of instruments here given, their adjustment and method of use, the determination of corrections, &c., though at times the author is tempted to indulge in too great detail. This error, if it be an error, arises from following too closely the reports and data furnished from the offices of the Coast Survey. The danger to be feared is that the minute care and attention to detail necessary in operations extending over a large area, may tend to make the subject repellent to a student whose main object is to gain an intelligent insight into the processes involved. But a greater fault appears to be one of omission. There is too little, almost nothing, concerning the methods of deriving the latitude and longitude of a station. And surely such matters are of quite equal importance with the measurement of a base line, and fall as decidedly within the compass of such a work. To be able to determine one's position on the earth involves something more practical than a mere college exercise. It is information that is frequently needed and may become a matter of great importance.

The first few chapters of the book are mainly occupied with the description of the use and adjustment of instruments in the field. The next three are devoted to consideration of problems connected with